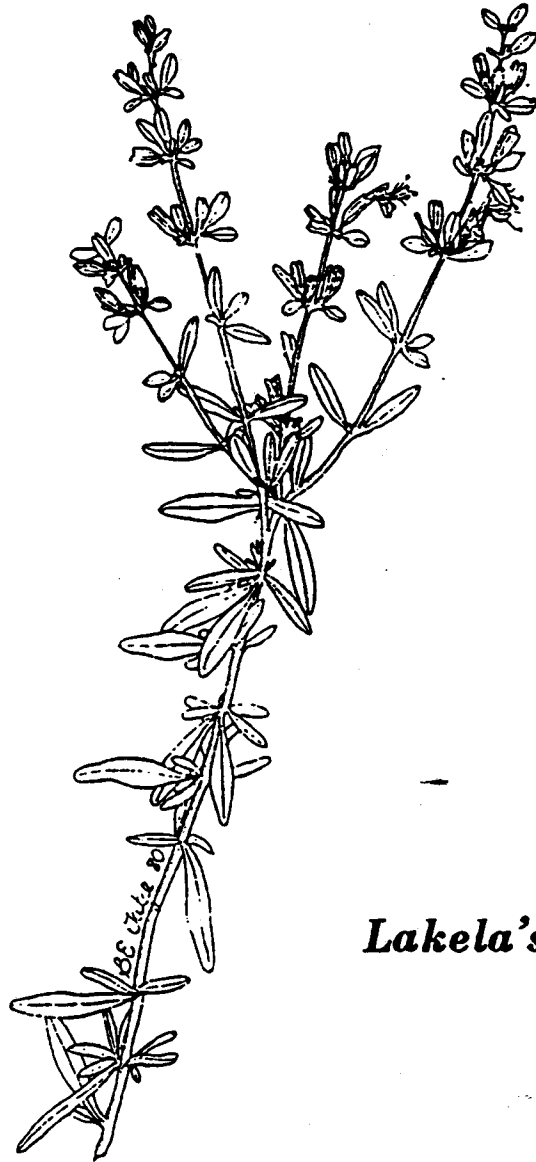


RECOVERY PLAN FOR THREE FLORIDA MINTS



Lakela's Mint


RECOVERY PLAN FOR THREE
FLORIDA MINTS

Longspurred Mint (Dicerandra cornutissima)
Scrub Mint (Dicerandra frutescens)
Lakela's mint (Dicerandra immaculata)

Prepared by

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Date:

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RECOVERY PLAN EXECUTIVE SUMMARY

1. Point or condition when the species can be considered recovered?

Any of the three perennial species of Dicerandra could be considered for reclassification to threatened status when ten separate, self-sustaining populations of the species are established at secure sites in peninsular Florida. This numerical goal is subject to revision as information becomes available on the population biology of each species and as suitable sites are found.

2. What must be done to reach recovery?

First, protect existing populations of the three species whenever this is possible. Second, start a germ plasm conservation program to protect against destruction of wild populations. Third, establish new populations of the 3 species on secure, suitable habitat.

3. What specifically must be done to meet the needs of #2?

Protecting existing populations of the mints may require short-term and emergency measures, and will require habitat protection and management, including prescribed burning or mechanical disturbance to prevent successional changes. Most sites are on small privately owned parcels of land, typically residential lots. A program of education and technical assistance for landowners may enable some sites to persist. Germ plasm conservation can be accomplished through two approaches: long term seed storage, and propagation and maintenance of plants in cultivation at a botanical garden. Establishment of new populations requires obtaining tracts of suitable, secure habitat. The availability of such habitat is probably the main limiting factor for this recovery plan. Dicerandra will be introduced into these sites and the results will be monitored.

4. What management/maintenance needs have been identified to keep the species "recovered?"

Habitat occupied by the three mints must continue to be protected and must be managed to prevent successional changes. Prescribed fire or mechanical disturbance may be appropriate.

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PART I. INTRODUCTION

Three species of the genus Dicerandra native to Florida, with very limited geographic ranges, have been determined to be endangered species pursuant to the Endangered Species Act of 1973, as amended: Lakela's mint (D. immaculata) on May 15, 1985 (50 FR 20212) and longspurred mint (D. cornutissima) and scrub mint (D. frutescens) on November 1, 1985 (50 FR 45621).

Description

Dicerandra is a genus of seven species in the mint family (Lamiaceae or Labiatae). Four species are annuals and three are shrubby, with woody bases and non-woody flowering shoots. Each has a strong minty odor. The three shrubby species are endangered. D. immaculata grows to 1.3 feet tall and has lavender-rose to purplish (rarely white) flowers without colored spots or markings, and with corollas that are strongly two-lipped and nearly straight (Lakela 1963, Kral 1983). Flowering mainly occurs from September to November, but sporadically through the remainder of the year (Austin et al. 1980). The other two species grow to 1.6 feet tall and have sharply bent corollas with dark reddish purple spots. D. frutescens has white or pale pink flowers and a hairy style (Kral 1983, Wunderlin 1984b). D. cornutissima has purple-rose flowers and a style with few, if any, hairs. Flowering occurs in September and October in both. The systematics of Dicerandra has been elucidated independently by Huck (1981, 1984), who described D. cornutissima, and by Kral (1982).

Distribution and Habitat

D. immaculata is endemic to the Atlantic Coastal Ridge between Vero Beach and Fort Pierce, a narrow sand ridge parallel to the west side of the Indian River. The Ridge is entirely quartz sand with no visible shell fraction. Part of the Ridge near Vero Beach has been mined for heavy minerals (White 1970). The Florida East Coast Railroad and U.S. Highway 1 both follow the Ridge. D. immaculata is known at present from nine sites within an area 0.5 mile wide by 3 miles long near the Indian River - St. Lucie County line. All are small and on private land (Kral 1983, Robinson 1981).

D. immaculata is restricted to the margins of sand pine scrub vegetation. It requires nearly full sun and does not tolerate much competition. The plant is found only on excessively drained sand soil. All of the sites have been disturbed to some degree. The plant occurs on sunny to lightly shaded sites on either bare sand or sand partly covered with leaves and other litter. The sites include the margins of a sand mine, edges of street rights-of-way, and a narrow path through a stand of scrub created by construction of an underground telephone cable. Because the area is along U.S. Highway 1 only 4 to 7 miles south of the center of Vero Beach, the entire area is subdivided. Land uses include houses (especially in a subdivision near 13th Street), stores and restaurants, and two separate, defunct sand mines.

D. cornutissima occurs southwest of Ocala on the Sumter Upland in Marion County, along and west of Interstate Highway 75 and, formerly, in northern Sumter County. The plant apparently was restricted to the margins of scrub vegetation that occurred in patches, surrounded by longleaf pine-turkey oak sandhill vegetation. The largest existing populations occur in two residential subdivisions situated in tracts of scrub. One subdivision, Ocala Waterway, is more or less abandoned, and the population here may number several thousand. The other, Marion Oaks, is actively under development and the population may number over 1,000. Populations of hundreds of individuals exist along both sides of Interstate Highway 75 east of the Ocala Waterway subdivision and along state road 484 near Marion Oaks. Between the two subdivisions lies the right-of-way of the Cross Florida Barge Canal, where a small population was found in 1975. This population became extinct before 1981 (Wunderlin 1984a). An examination of the Barge Canal right-of-way in 1975 did not reveal any other populations of the plant, although suitable scrub habitat did, and still does, exist. Collections of D. cornutissima were made in 1938 and 1946 seven miles south of the Marion Oaks subdivision in northern Sumter County, but no suitable habitat is left at the old collection sites today, although scrub vegetation may exist between these sites and Marion Oaks (Wunderlin 1984a).

D. cornutissima is restricted to sunny sites with bare sand. It generally shares sites with species of Andropogon, Bulbostylis, Cyperus, Aristida, Panicum, Cenchrus, Polygonella, Lechea, Hypericum, Opuntia, etc. (Kral 1983). The development of residential subdivisions has created strips of such habitat along street rights-of-way, where the plant has spread aggressively. The small population found on the Cross Florida Barge Canal right-of-way in 1975, was on berms created in the 1930's by construction for the abortive Gulf Atlantic Ship Canal and in a turkey oak woodland north of the canal diggings (Florida Game and Fresh Water Fish Comm. 1976).

The population has since disappeared (Wunderlin 1984a). This was the only locality where the plant has been found in sandhill vegetation; it may have spread from the canal berm into surrounding vegetation.

D. frutescens is endemic to a very limited portion of the Lake Wales Ridge in Highlands County. The mint is presently known from four localities: at Archbold Biological Station; in the Sun 'n' Lakes Estates subdivision east of U.S. highway 27 and southeast of the town of Lake Placid (streets have been laid out in this subdivision, but few houses or trailers are in place); at YMCA Camp Florida on the west side of Grassy Lake southeast of the town of Lake Placid; and on a sand ridge along the northwest shore of Lake Placid (R. Myers, Archbold Biological Station, pers. comm., 1986). These areas represent remnants of native vegetation surrounded by agricultural and residential areas.

D. frutescens is found in sites marginal to or disturbed areas within sand pine scrub and Florida sandhill habitat (longleaf pine or south Florida slash pine with deciduous oaks and grasses). The largest population, at the Archbold Biological Station, is largely restricted to fire lanes where bare sand is present (Wunderlin 1984a). The area has been protected from fire since 1927, resulting in the invasion of sandhill vegetation by plants characteristic of scrub (Myers 1985). Unfortunately, there is no information on the local distribution or abundance of this plant before fire protection began. All of the existing sites are moderately disturbed, are on Paola soils with a shallow E horizon, and have abundant scrub hickory. "The combination of disturbance, soils, and vegetation ... suggests that the species' habitat is the transition between scrub and sandhill vegetation..." (R. Myers, Archbold Biological Station, pers. comm., 1986).

Population Status

D. immaculata was not discovered until 1962 (Lakela 1963), so its historical distribution and population status are unknown. The plant was, however, almost certainly restricted to a limited area. Only nine colonies are known to exist, all on private lands. One site, privately owned, is fenced, but all other colonies, especially those on vacant subdivision lots, are highly vulnerable and most will probably be developed for residential or commercial purposes within a few years. Therefore it is important to monitor the sites and ensure germ plasm conservation through seed storage and creation of cultivated populations.

D. frutescens is protected at the Archbold Biological Station where it appears to be able to persist indefinitely in fire lanes.

The site at Camp Florida may be protected. The sites at Sun 'n' Lakes Estates and north of Lake June in Winter are highly vulnerable to development.

Dicerandra cornutissima at the present time occurs in larger numbers and over a somewhat wider geographic area than the other two species, but none of the existing sites is protected. The largest population is in a subdivision where the plants thrive at the edges of road rights-of-way. As houses are constructed, the plants unavoidably disappear (Kral 1983, Wunderlin 1984a).

Reproductive Status

The three perennial species of Dicerandra are obligate outcrossers that reproduce entirely by seed (Huck 1984). Each has spurred anthers, which must be triggered by insect pollen vectors (usually the Apidae) for pollen to be released and dispersed (Huck 1984). Woodlanders, a nursery in Aiken, S.C., has successfully propagated the three woody species of Dicerandra. "All three species now appear to root easily from cuttings. Like some other shrubby mints, cuttings should be taken of vegetative growth without flowers or flower buds. Cuttings with flowers or flower buds will root but most will flower and die ..." Mature plants of the three woody species, grown in a garden that simulated sandhill habitat, produced and shed abundant seed. Much of the seed from D. cornutissima and D. frutescens that fell on bare yellow sand germinated in fall and survived the winter, even though the parent plants died. No seedlings of D. immaculata have been seen. The nursery has collected seed from cultivated Dicerandra plants "by harvesting the mature branches with seed capsules and letting them dry in a paper bag. The capsules are later stripped off and run dry in a blender (briefly) then screened and cleaned by blowing away the chaff and trash" (R. McCartney, Woodlanders nursery, pers. comm., May 1986). McCartney considers the three woody Dicerandras to be showy plants that may be "too exacting in their cultural requirements and rather late flowering for general use as garden plants..." These plants may behave as annuals when cultivated in colder climates. Woodlanders has offered the three species for sale. Seed produced at Woodlanders has been supplied to the National Herb Garden at the U.S. National Arboretum for propagation purposes, and plants raised by Woodlanders have been planted at Bok Tower Gardens, Lake Wales, Florida (R. McCartney, Woodlanders, pers. comm. 1985, 1986 and J. Shaw, President, Bok Tower Gardens, pers. comm. 1985).

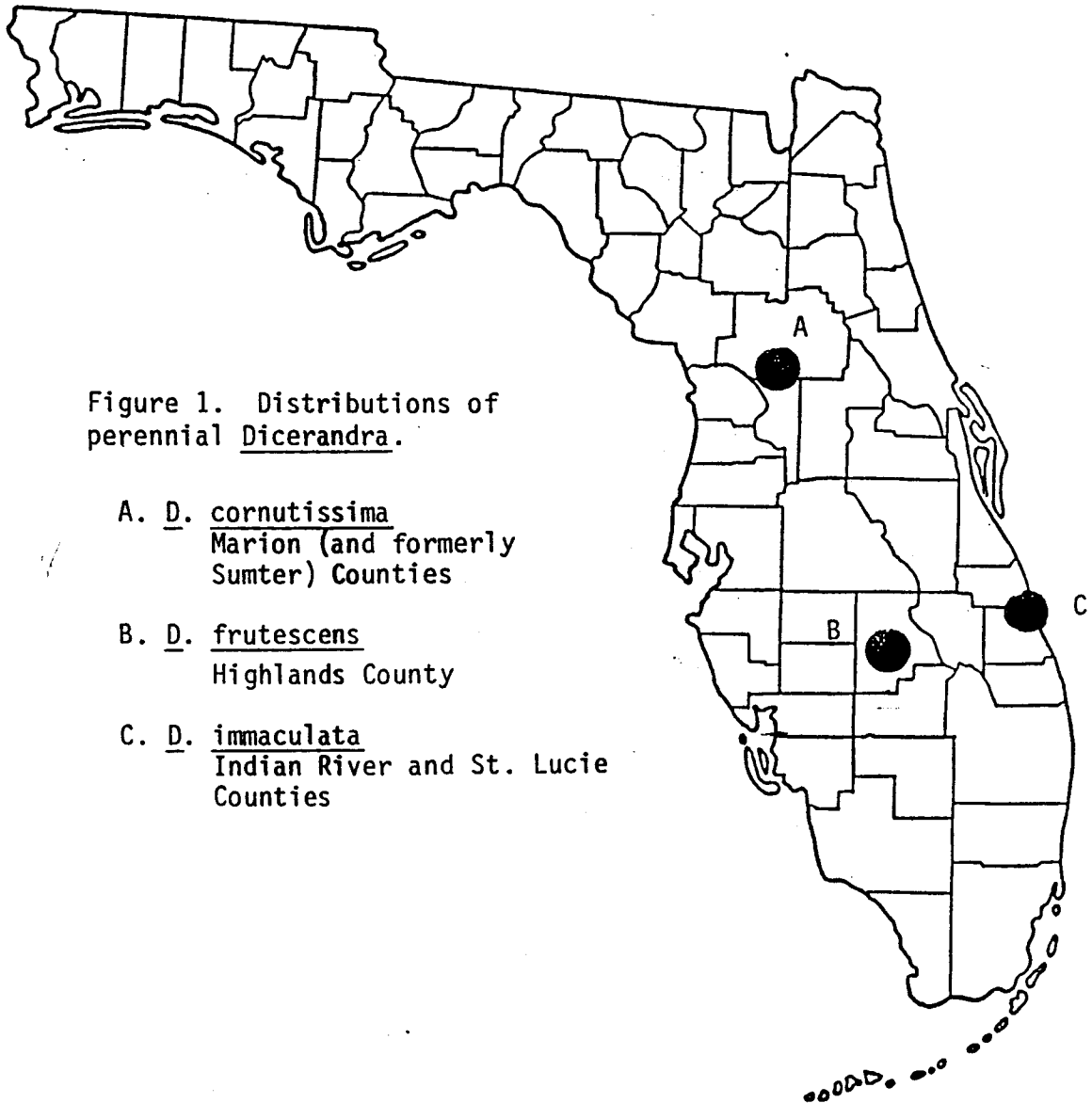


Figure 1. Distributions of perennial Dicerandra.

- A. D. cornutissima
Marion (and formerly
Sumter) Counties
- B. D. frutescens
Highlands County
- C. D. immaculata
Indian River and St. Lucie
Counties

Limiting Factors

These three species appear to have very similar life histories and habitat requirements. Before extensive settlement of the Florida peninsula began, these plants were apparently restricted to small geographic ranges that were defined by the geographic distribution of sand pine scrub vegetation or, more precisely, by the locations of bare sand at the margins of scrub vegetation. The dependence of *Dicerandra* on bare sand exposed to sunlight indicates that these mints benefitted from the occasional fires or hurricanes that destroyed sand pines and evergreen scrub oaks. It is likely that the population sizes and the number of populations of each species fluctuated considerably as new sites were colonized and as shrubs and trees grew and shaded out old sites. Because these plants are obligately pollinated by insects that trigger the anther spurs, anything that reduces the availability of insect vectors may be a limiting factor in the reproduction of these species. The open, sunny sites that these plants inhabit attract pollinators (R. Huck, pers. comm., 1986).

Much of the original habitat of each species has now been converted to agricultural or urban uses. In some cases, disturbance associated with development has created suitable sites for the mints to colonize, but the sites are in most cases temporary. Because these plants thrive best on sunny sites with little competition from other plants, they are edaphic-specific, and are not associates of scrub or sandhill communities per se (R. Huck, pers. comm., 1986). However, these species almost always occur at the edges of scrub habitat, and the limited acreage of remaining scrub vegetation is the principal limiting factor for each species.

Threats to Future Existence

The primary threat to the future existence of these mints is the further destruction or degradation of the the remaining sand pine scrub and sandhill habitats in the areas where the species are found. Development has already severely affected all three species. In Highlands County (*D. frutescens*), 74.4 percent of the xeric vegetation (scrubs, scrubby flatwoods, and sandhills) present before settlement had been destroyed or disturbed by 1981, mainly by development of citrus groves and residential subdivisions (Peroni and Abrahamson 1985). The situation in Marion County (*D. cornutissima*) is similar, except that habitat destruction has been caused mostly by urbanization. In Indian River and St. Lucie counties (*D. immaculata*), the urbanization of scrub vegetation is nearly complete. Preservation and appropriate management of suitable scrub and sandhill habitats is essential if these species are to survive.

The existing populations of D. immaculata are small enough that the species may already be facing depletion of its gene pool. A population that contained plants with white flowers three times the average size and a loose growth habit, along with typical plants (R.R. Beyer, Chattanooga, TN, pers. comm., 1983), was destroyed in 1982 by construction of a parking lot and store along U.S. highway 1. White-flowered individuals have since been found only once. Germ plasm conservation is urgently needed for this species; the other two species may be facing the same problem, but not to the same degree.

PART II. RECOVERY

A. Recovery Objective

The objective of this recovery plan is to restore each of the three perennial *Dicerandras* (longspurred mint, scrub mint, and Lakela's mint) to a stable, secure, and self-sustaining status allowing removal of these species from protection under the Endangered Species Act.

Any of the three could be considered for reclassification to threatened status when ten separate, self-sustaining populations of the species are established at secure, maintained sites in peninsular Florida. Recovery and delisting could be considered for any species if 20 separate, self-sustaining populations are established at secure sites in peninsular Florida. These numerical goals are tentative and subject to change based on new information that may be developed during the recovery process.

B. Step-down Outline

1. Protect and manage existing populations.
 11. Inventory and monitor existing populations.
 12. Implement short-term and emergency protective measures.
 121. Seek short-term protection of populations.
 122. Remove plant material from sites where destruction is imminent.
 13. Provide long-term protection and management.
 131. Seek opportunities for habitat protection and management.
 132. Obtain protected status for sites.
 133. Initiate protective management of habitat.
 1331. Control access.
 1332. Prevent habitat degradation.
 1333. Prevent successional loss of habitat.
 134. Educate, and provide technical assistance to, private owners of sites.

- 1341. Develop written guidelines for owners of Dicerandra habitat.
- 135. Encourage the State to pursue a tax incentive program to encourage landowners to conserve undeveloped property.
- 2. Conserve germ plasm.
 - 21. Place seed in long-term storage.
 - 22. Propagate plants.
 - 221. Select and/or develop appropriate methods.
 - 222. Produce plants for collections.
 - 23. Establish collection(s) of living plants.
 - 231. Monitor the status of collections.
- 3. Establish and manage new populations.
 - 31. Determine priorities for new population establishment.
 - 32. Evaluate ecological and reproductive requirements.
 - 321. Describe the environments of extant populations.
 - 322. Evaluate the reproductive biology of Dicerandra.
 - 33. Obtain secure, suitable habitat.
 - 331. Assess physical environment and vegetation of each possible site.
 - 332. Assess size of site.
 - 333. Assess site security.
 - 334. Obtain the use of appropriate sites.
 - 34. Introduce Dicerandra into suitable sites.
 - 35. Monitor and manage new Dicerandra populations.
- 4. Refine recovery goals.
 - 41. Reassess the number of sites and individuals necessary to constitute stable, secure, and self-sustaining species.
 - 42. Determine additional actions necessary to achieve recovery.

C. Outline Narrative

- 1. Protect and manage existing populations.
The remaining sites where Dicerandra species occur must be protected as the first step toward recovery. These sites are at present the only ones which offer assurance of supporting the species. Plant stocks for expanded or new populations must come from these sites. Management must be provided to ensure that sites remain suitable for the plants.
 - 11. Inventory and monitor existing populations.
The status of populations can change rapidly. Regular monitoring is essential since habitat loss or modification can occur quickly.
 - 12. Implement short-term and emergency protective measures.
It may become necessary to respond to emergency situations where habitat destruction is imminent. It

will be desirable to contact landowners even before the recovery plan receives final approval.

121. Seek short-term protection of populations.

Interim measures to slow or prevent habitat loss will be worthwhile.

122. Remove plant material from sites where destruction is imminent.

This is a last resort to be employed only when destruction of the plants cannot be prevented and when the plant material can be used to enhance the recovery of the species.

13. Provide long term protection and management.

D. frutescens is protected at the Archbold Biological Station and possibly at Camp Florida. D. immaculata is protected at a privately owned site. Protection of other remaining sites for these species as well as for D. cornutissima is the most important step toward recovery.

131. Seek opportunities for habitat protection and management.

Evaluate the future prospects for the sites and opportunities for conservation measures.

132. Obtain protected status for sites.

Conservation easements, lease agreements, acquisition by conservation organizations or Federal, State or local agencies, or protection by other means must be sought.

133. Initiate protective management of habitat.

At the present time, the following appear to be the major concerns. Other measures may be identified in the future.

1331. Control access.

Prevent or limit access by off-road vehicles and/or pedestrians, where feasible and appropriate.

1332. Prevent habitat degradation.

Prevent destruction of scrub vegetation, trash dumping, or site disturbance. On road rights-of-way, arrange for mowing or other maintenance to be deferred until after flowering and seed set.

1333. Prevent successional loss of habitat.

All three species of Dicerandra inhabit bare sand that is not excessively shaded by evergreen oaks or sand pines. Protected sites must be monitored for tree and shrub encroachment. To control such encroachment,

measures such as prescribed burning, cutting, bush hogging, or maintenance of fire lanes will probably be necessary. Fire is the first choice management tool where it is feasible, because the sandhill and scrub ecosystems are fire maintained.

134. Educate, and provide technical assistance to, private owners of sites.

Provide educational and consulting support to landowners who protect, or are interested in protecting, sites. Appropriate services include providing written materials, responding to inquiries, and visits by knowledgeable persons. Agricultural extension services can provide a model for this educational program. Subdivisions containing Dicerandra (especially Dixie Heights in Indian River County and Marion Oaks and Ocala Waterway in Marion County) require materials specific to each subdivision.

1341. Develop written guidelines for owners of Dicerandra habitat.

Landowners interested in protecting Dicerandra sites will benefit from clear, nontechnical, written guidance. In particular, it may be possible to reduce the likelihood of extirpation of D. cornutissima from vacant lots in residential subdivisions by providing guidelines for lot development, landscaping, and yard management that would allow for the survival of the plant. Such guidelines must address the potential fire hazard posed by remnants of scrub vegetation.

135. Encourage the State to pursue a tax incentive program to encourage landowners to conserve undeveloped property.

A tax incentive program can be an effective tool in protecting and managing undeveloped lands.

2. Conserve germ plasm.

21. Place seed in long-term storage.

The Center for Plant Conservation has a cooperative agreement with the U.S. Department of Agriculture, National Germ Plasm System, to store seed of endangered species. Dormancy testing of seeds is needed to determine whether storage is feasible.

22. Propagate plants.

The Center for Plant Conservation prefers to propagate from seed, which has the advantage of only minimally disturbing wild plants. Cuttings from wild plants are advantageous in that they allow for preservation of genotypes that have succeeded in the wild. William Gensel (North Carolina State Univ., pers. comm., 1984) emphasizes that propagating wild genotypes ensures against inadvertent selection favoring genotypes adapted to cultivation but not to the wild.

221. Select and/or develop appropriate methods.

Woodlanders Nursery of Aiken, S.C., has been able to propagate all three species from cuttings (R. McCartney, Woodlanders, Inc., pers. comm. 1985, 1986). Bok Tower Gardens has begun propagation of all three species. Propagation from seed is feasible for D. frutescens and D. cornutissima. More work may be needed on seed propagation of D. immaculata.

222. Produce plants for collections.

23. Establish collection(s) of living plants.

Collections of living plants in botanical gardens or arboreta serve as foundation stocks of plant material for establishing new populations in the wild. There appears to be little danger of the three species hybridizing in cultivation. Controlled crosses performed in a 1980-82 breeding experiment indicated that perennial Dicerandras are genetically isolated from one another. This conclusion is based on 63 cross attempts with the expectation of 252 nutlets. None of the progeny matured to flower (Huck 1984).

231. Monitor the status of collections.

Procedures for managing collections or experimental populations can be refined as experience is gained.

3. Establish and manage new populations.

Much information and experience needed for establishing new populations can be obtained from work with the plants in cultivation (see 2). Protected sites with suitable habitat can be considered for reintroduction of the respective species.

31. Determine priorities for new population establishment.

D. immaculata is in the greatest danger of extinction; thus it is the first priority for population establishment.

32. Evaluate ecological and reproductive requirements.

Relatively complete information is already available, and will be useful in population establishment efforts.

321. Describe the environments of extant populations.
Soil series, degree of shade, percent of ground cover by litter or plants, and history of disturbance (including frequency and intensity of disturbance) are relevant. Recommend the type and frequency of disturbance most likely to benefit Dicerandra. Good information is available on the biological environment of D. frutescens at Archbold Biological Station.
322. Evaluate the reproductive biology of Dicerandra.
Substantial information is already available in Huck (1984) and other sources. Work with cultivated plants will provide practical experience.
33. Obtain secure, suitable habitat.
D. immaculata may be accommodated on the Savannas State Preserve in Indian River County, if it is not already present there. The most satisfactory sites would be tracts of scrub and/or sandhill habitat that can be managed to conserve the ecosystem and its biota. However, the habitats occupied at present by these species (road right-of-way edges and vacant lots) indicate that suitable habitat does not have to be pristine natural vegetation. Disturbed areas may be satisfactory. New populations should be established on the landforms where the plants are native; Sumter Upland for D. cornutissima, Lake Wales Ridge for D. frutescens, and the segment of the Atlantic Coastal Ridge from Vero Beach to Stuart for D. immaculata.
331. Assess physical environment and vegetation of each possible site.
Examine each site for the same characteristics that have been examined at sites with extant populations (32.).
332. Assess size of site.
Determine the minimum size for Dicerandra preserves. Larger preserves offer opportunities to conserve more of the species that make up the ecosystem.
333. Assess site security.
Evaluate present security, possible improvements, and future hazards.
334. Obtain the use of appropriate sites.
Conservation easements, lease agreements, or acquisition by conservation organizations or Federal, State or local agencies, or other protective means are desirable.

34. Introduce Dicerandra into suitable sites.

A decision must be made on whether to introduce Dicerandra to the sites by transplanting propagated plants or by sowing seed, or both. The former option requires propagation facilities, and the latter may require substantial quantities of seed. The provisions of the Endangered Species Act regulating interstate commerce in endangered species make it easiest to do such propagation or seed production within Florida; however, Robert McCartney (Woodlanders Inc., pers. comm. 1986) has noted that commercial producers of flower and herb seed, located primarily in California, may be best equipped to produce large quantities of seed economically.

35. Monitor and manage new Dicerandra populations. New populations should be monitored regularly for numbers and condition of Dicerandra and for threats to the site. Management actions (as in 133.) should be initiated as needs are identified.4. Refine recovery goals.

It will be possible to refine recovery goals as the recovery process proceeds.

41. Reassess the number of sites and individuals necessary to constitute a stable, secure and self-sustaining species.

Recovery goals will be revised as necessary.

42. Determine additional actions necessary to achieve recovery.

These actions include legal protection, research, habitat protection, and management strategies necessary to achieve recovery.

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PART III. IMPLEMENTATION SCHEDULE

Priorities in Column 4 of the following Implementation Schedule are assigned as follows:

- Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
- Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.
- Priority 3 - All other actions necessary to provide for full recovery of the species. (Recognizing that the ultimate success of the program is species recovery, priority 3 actions likely to lead to full recovery and delisting of a species in the foreseeable future will tend to rank higher than other priority actions.)

IMPLEMENTATION SCHEDULE

Three Florida mints (Recovery priority #)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency		Estimated Fiscal Year Costs			Comments/Notes
					FWS	Other	FY 1	FY 2	FY 3	
I-1	Inventory/monitor existing populations	11	1	1yr./ongoing	4	FNAI	\$7k	\$3k	\$3k	
M-1,3 A-2,3	Short-term emergency measures	12	1	1-2 yrs.	4		\$2k			
M-3, A-2,3	Short-term protection of populations	121	2	1-2 yrs.	4	Indiv.	\$2k	\$2k		
M-1	Remove plants from doomed sites	122	2	1-2 yrs.	4	Indiv. FDACS	\$1k	\$1k		
I-14	Seek opportunities for long term protection	131	1	5 yrs.	4					
A-1,2,3, 5,6,7	Obtain protected status for sites	132	1	5 yrs.	4	Indiv.	\$2k	\$5k	\$3k	
M-3,4,7	Protective habitat management	133	1	ongoing/continuous	4	Indiv.	\$3k			
M-5	Control access	1331	2	ongoing/continuous	4					
M-3	Prevent habitat degradation	1332	1	ongoing/continuous	4					

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES *

Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

* (Column 1) - Primarily for use by the U.S. Fish and Wildlife Service.

IMPLEMENTATION SCHEDULE

Three Florida mints (Recovery priority #)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency		Estimated Fiscal Year Costs			Comments/Notes
					FWS	Other	FY 1	FY 2	FY 3	
M-3	Prevent successional loss of habitat	1333	1		4					
0-1	Educate/assist site owners	134	3	ongoing/continuous	4		1k			
0-1	Prepare written guidelines for site owners	1341	3	1 yr.	4					
M-7	Encourage State tax incentives for site owners	135	3	ongoing/continuous	4					
M-7	Place seed in storage	21	3	1 yr/ongoing	4	CPC, USDA				
I-7, M-1	Propagate plants	22	1	2 yrs.	4	CPC	2.5k	2.5k	2.5k	
M-1	Establish collection(s) of living plants	23	2	5 yrs.	4	CPC	3k	2k	2k	
I-7	Monitor status of collections	231	2	ongoing/continuous	4					
I-13	Determine priorities for establishing new populations	31	2	1 yr.	4			1k		

IMPLEMENTATION SCHEDULE

Three Florida mints (Recovery priority #)

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency		Estimated Fiscal Year Costs			Comments/Notes
					FWS	Other	FY 1	FY 2	FY 3	
I-3,6	Evaluate ecological and reproductive requirements	32	2	1 yr.	4					
I-2	Assess environment of each possible site	331	3	2 yrs.	4	1k				
I-3	Assess site size	332	3	2 yrs.	4					
O-2,4	Assess site security	333	3	2 yrs.	4					
A-1,2,3,6	Obtain appropriate sites	334	3	5 yrs.	4		5k		5k	
M-2	Introduce Dicerandra to suitable sites/monitor	34	2	5 yrs.	4				2k	
I-1	Reassess number of sites and individuals needed to achieve recovery	41	3	1-5 yrs.	4					
I-4	Determine additional necessary actions	42	3	1-5 yrs.	4					

ABBREVIATIONS

CPC
FDACS
FNAI
Indiv.
USDA

Center for Plant Conservation, including participating botanical gardens
Florida Department of Agriculture and Community Services
Florida Natural Areas Inventory
Individuals
U.S. Department of Agriculture

APPENDIX
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